



# INVESTOR MEETING 2014

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Data Center Group

# Key Messages

Big industry trends fuel data center growth

Investing to win across workloads & segments

Revenue CAGR at 15% through 2018\*

# Capitalizing on Industry Trends

## Move to Digital Service Economy



## Jevons Paradox

Increase in  
technology  
efficiency

Increases  
rate of  
consumption



Leads to  
new usages

Resulting in Four  
Data Center  
Growth Drivers

Cloud

NFV / SDN

HPC

Big Data



2014

# China's Singles' Day 2014 11/11



63%  
INCREASE  
VS. 2013

**\$9.3** BILLION IN SALES

&

85%  
INCREASE  
VS. 2013

**278M** TRANSACTIONS

*in One Day*

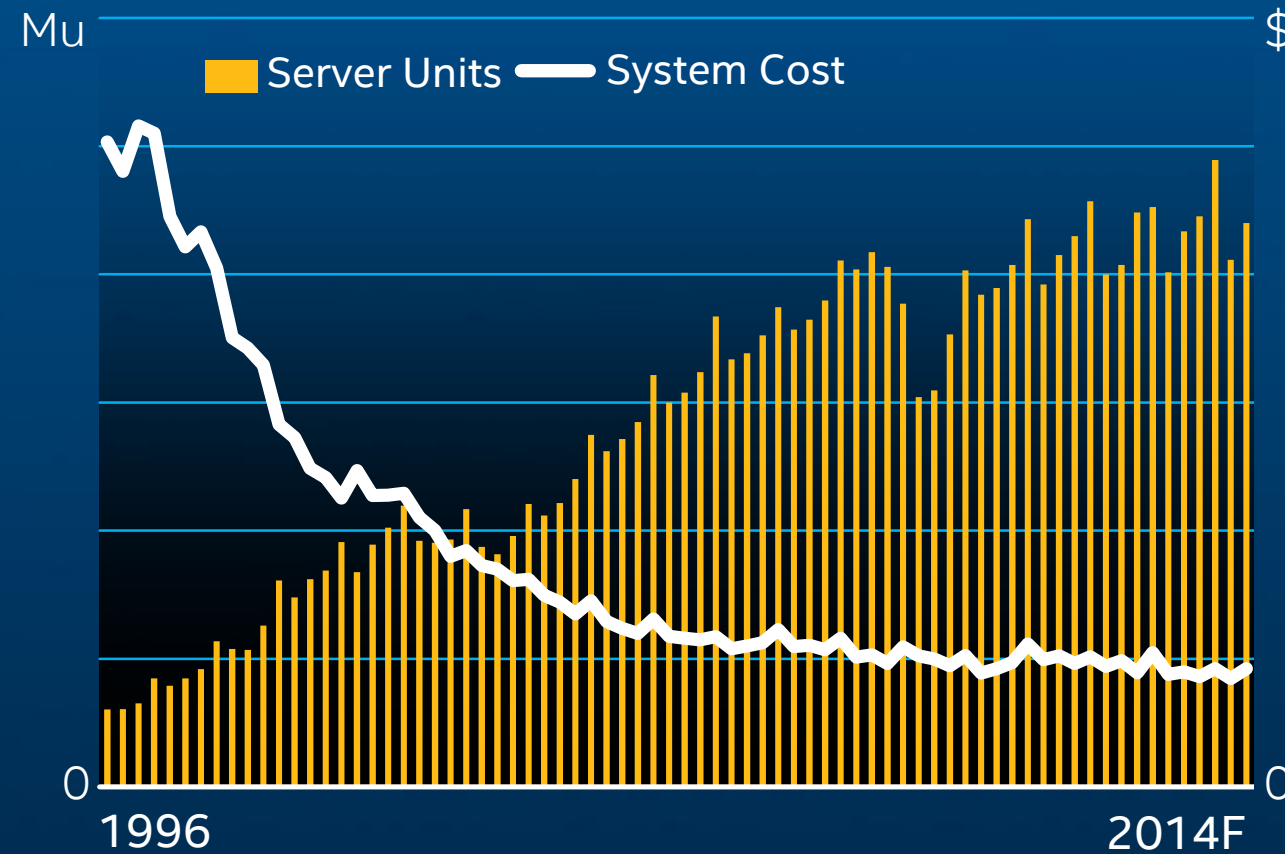
**43%** of transactions from mobile devices

Source: Alibaba, November 2014

\* Other names and brands may be claimed as the property of others.

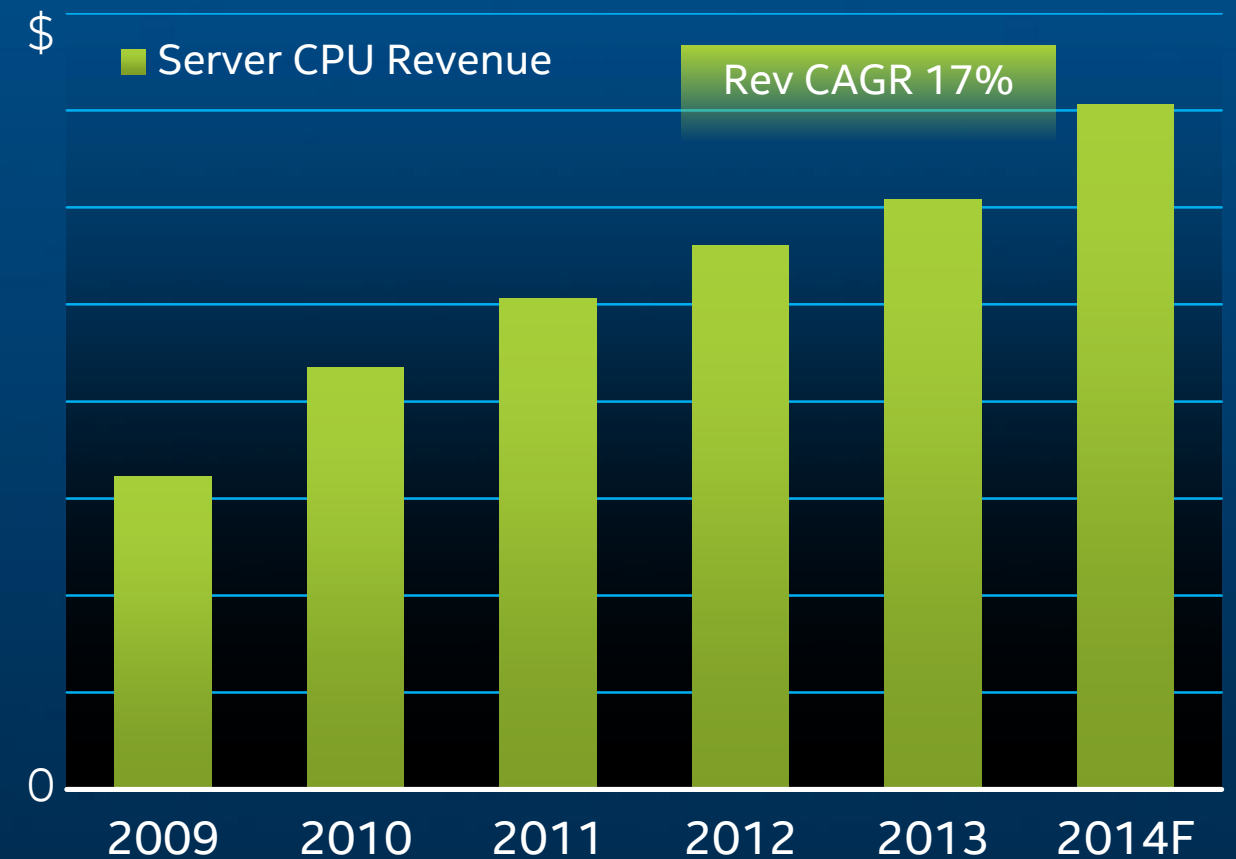
# Jevons Paradox

Impact of high volume x86 servers  
1996-2014



SHV servers delivered **80%** system cost savings over RISC & drove **625%** increase in volume

Move to virtualization fuels growth  
Revenue 2009-2014



**5X** improvement in server utilization results in **17%** revenue CAGR

Next efficiency transformation  
Cloud Architecture & NFV / SDN

# Data Center Transformation

## Enterprise IT

In 2014, **12%** of Enterprise IT deploying private cloud

**UBS**  
NFV/SDN connecting a Hadoop cluster for banking operations

## Cloud Service Provider

**Tencent**  
Deployed NFV / SDN for Cloud network

**AWS**  
Deployed 729 TFLOP HPC cluster, 71K cores in 60 min

## Telco Service Provider

**China Telecom + VMware**  
Delivering hybrid cloud, IaaS

**China Mobile**  
Big Data solution for billing inquiry service

## Technical Computing

**Paypal**  
Semantic analysis using HPC for detecting anomalous transactions

Growth Drivers Underlie All Segments

Cloud

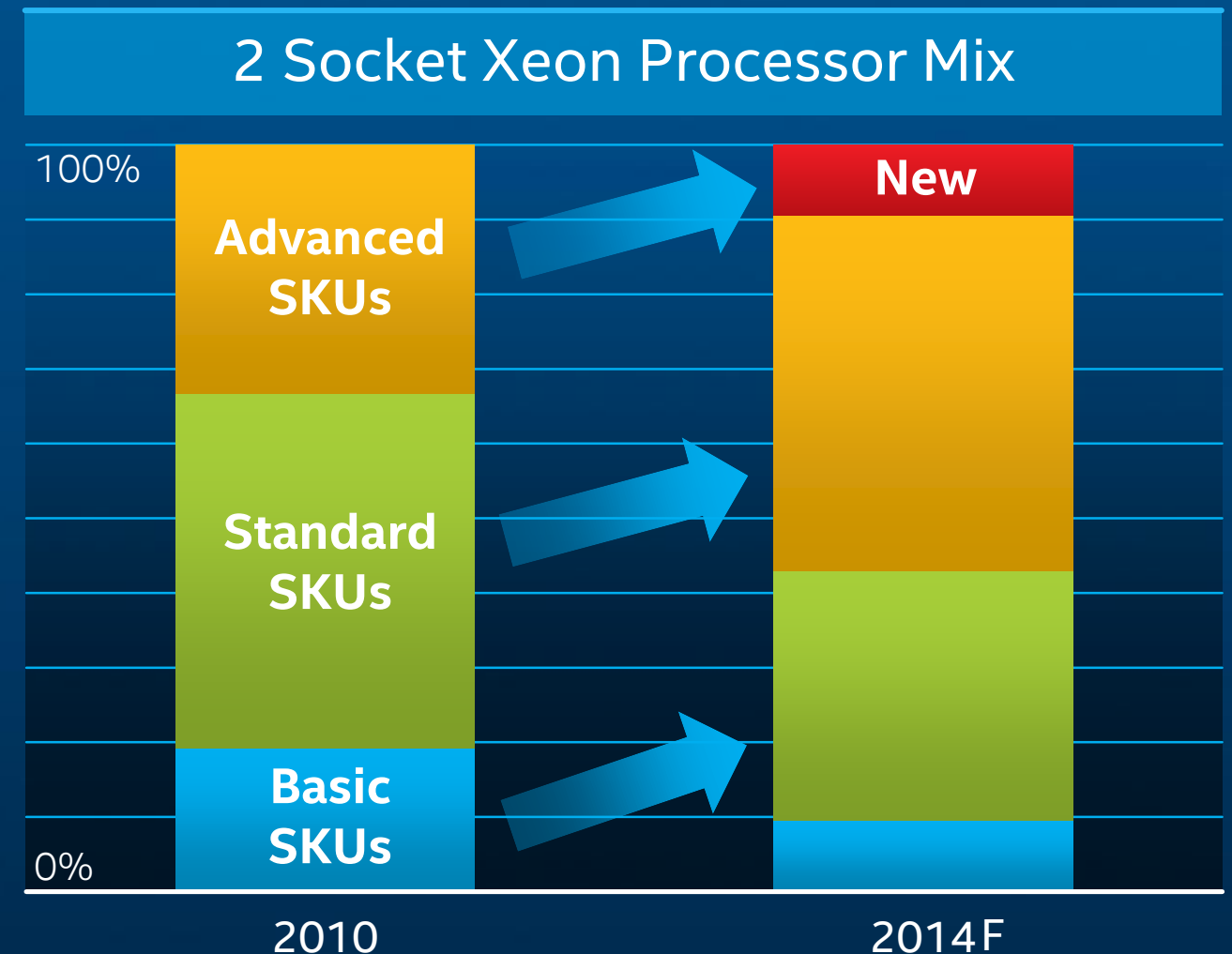
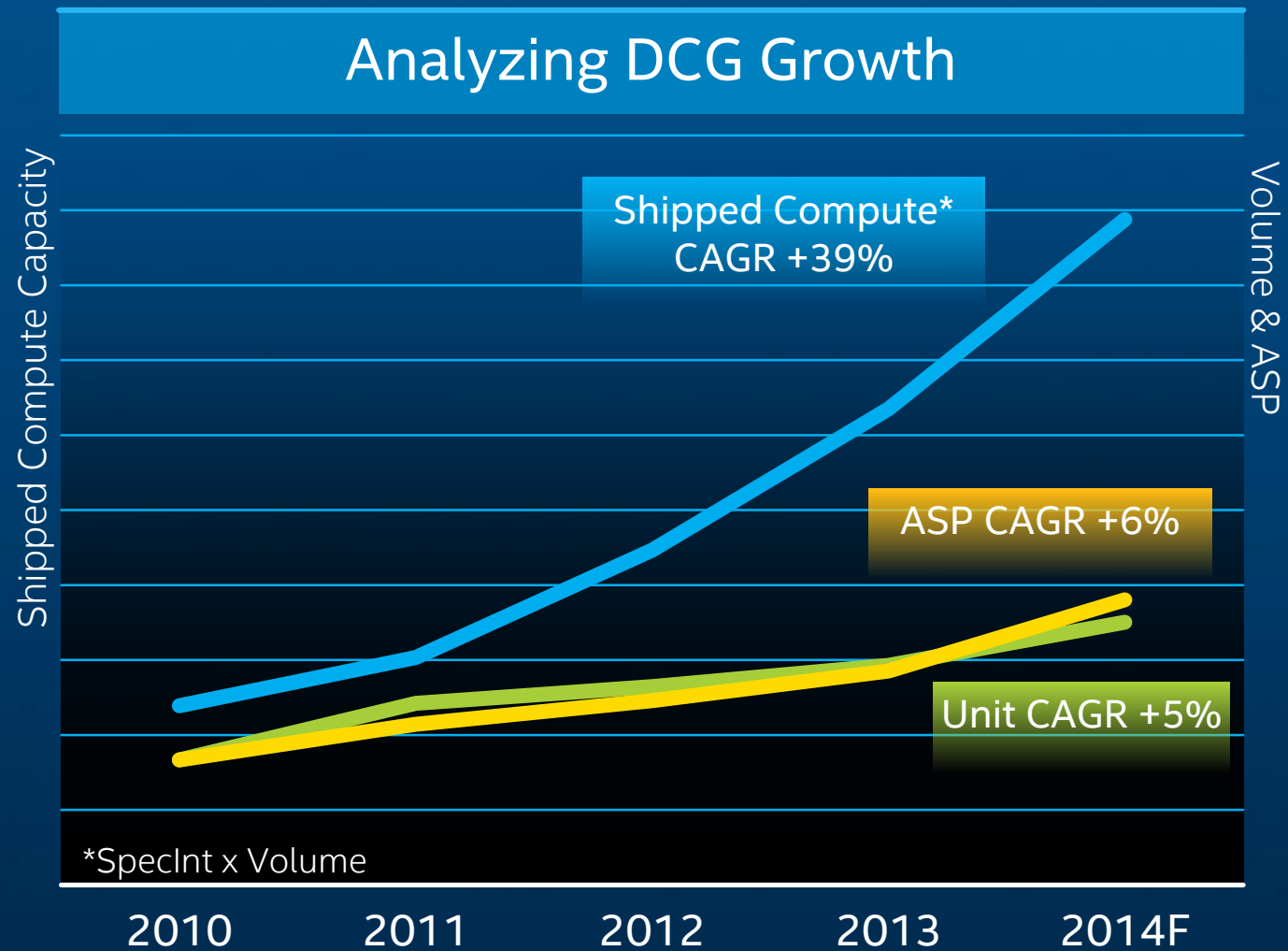
NFV / SDN

HPC

Big Data



# Compute Capacity Drives Purchase Decision



Increased capacity per system drives up processor mix  
**70% of volume moves up over 4 years**

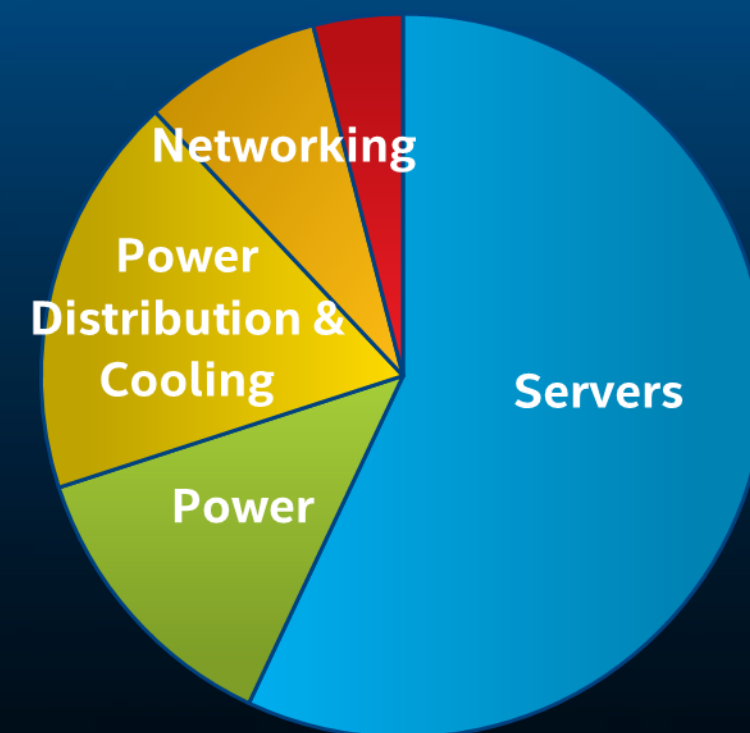
# Compute Capacity Drives End-user Value

## Enterprise IT TCO

Cost / Bandwidth	Server A	Server B
CPU	Haswell, <b>10 cores</b>	Haswell, <b>6 cores</b>
RAM	256GB	256GB
Avg. System Cost	\$10,519	\$7,519
# of Servers	10	19
<b>4-year TCO</b>	<b>\$543,932</b>	<b>\$977,672</b>

SKU selection provides  
Up to 44% TCO savings over 4 years

## Amazon's TCO Analysis

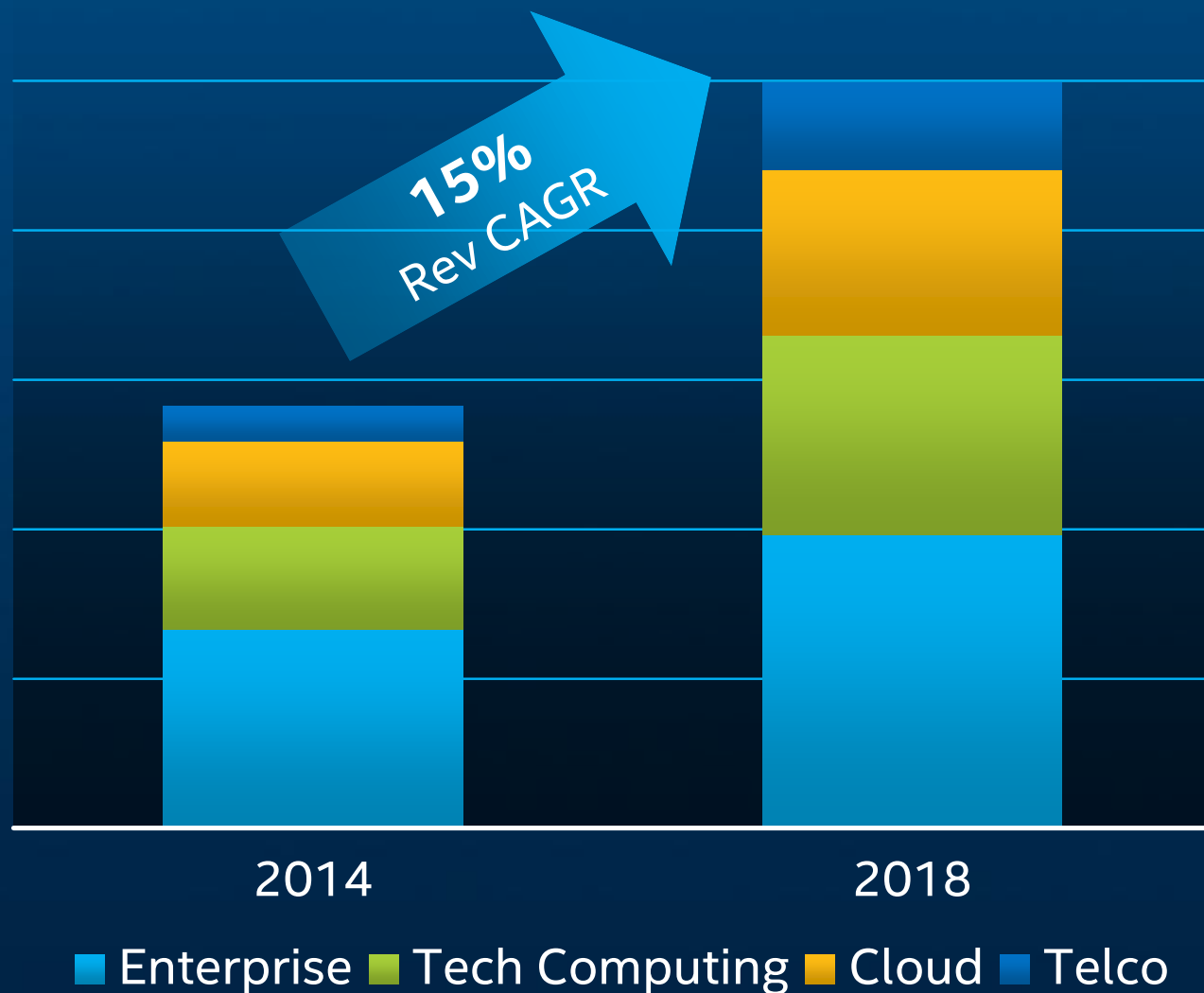


Customized SKU provides  
Up to 14% more performance for 2-4%  
incremental TCO

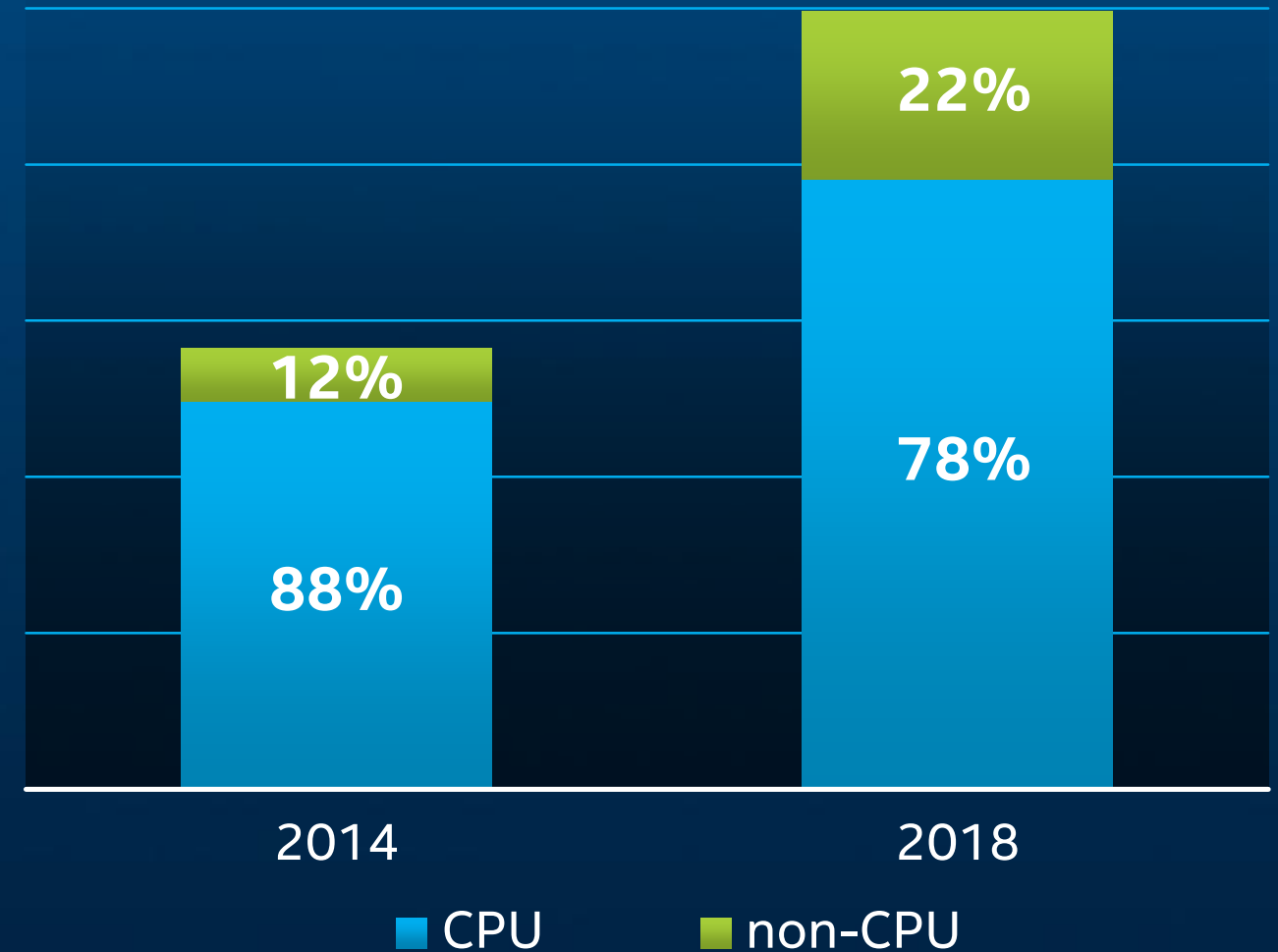


# Data Center Growth Forecast

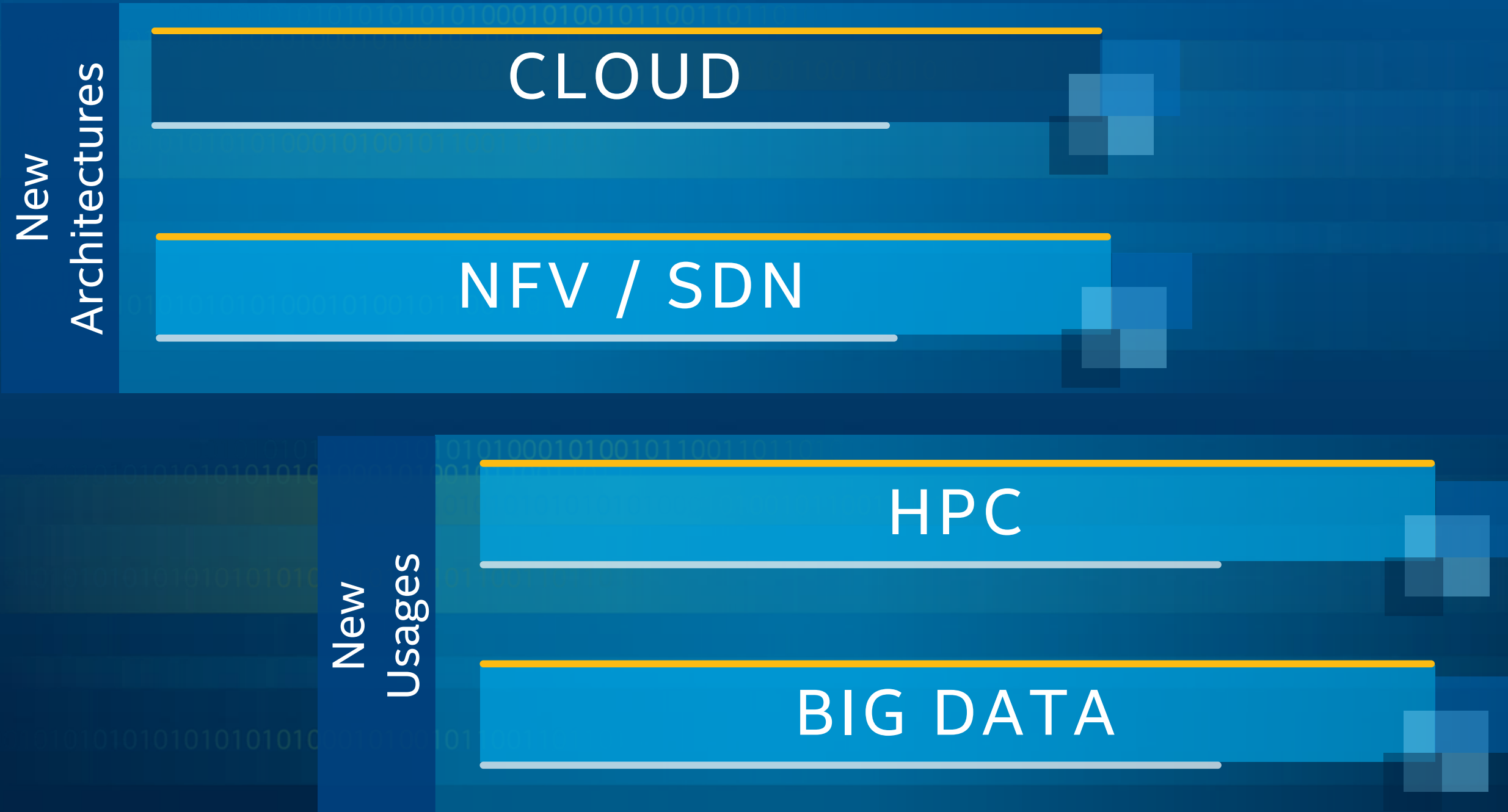
## Data Center Revenue Forecast



## Data Center Portfolio Diversifying



# Four Growth Drivers



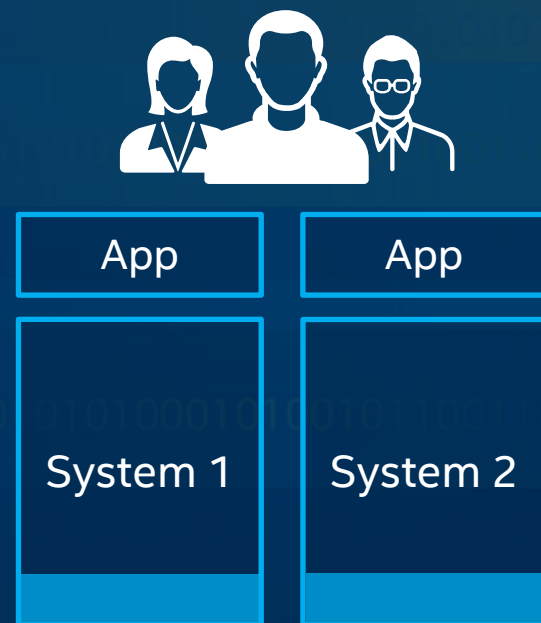
# Jevons Paradox: Cloud Architecture

## Increased efficiency through the Cloud

Revenue Acceleration: Easier to create new apps and services

OpEx Efficiency: Automation of the data center

CapEx Efficiency: Maximize use of system resources

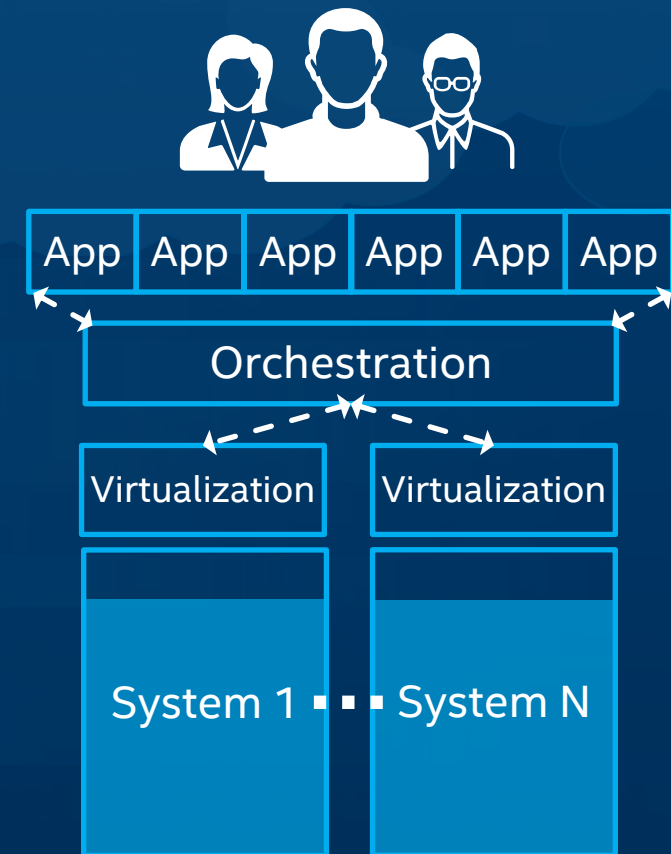


Traditional



Virtualized

1. Shared resources



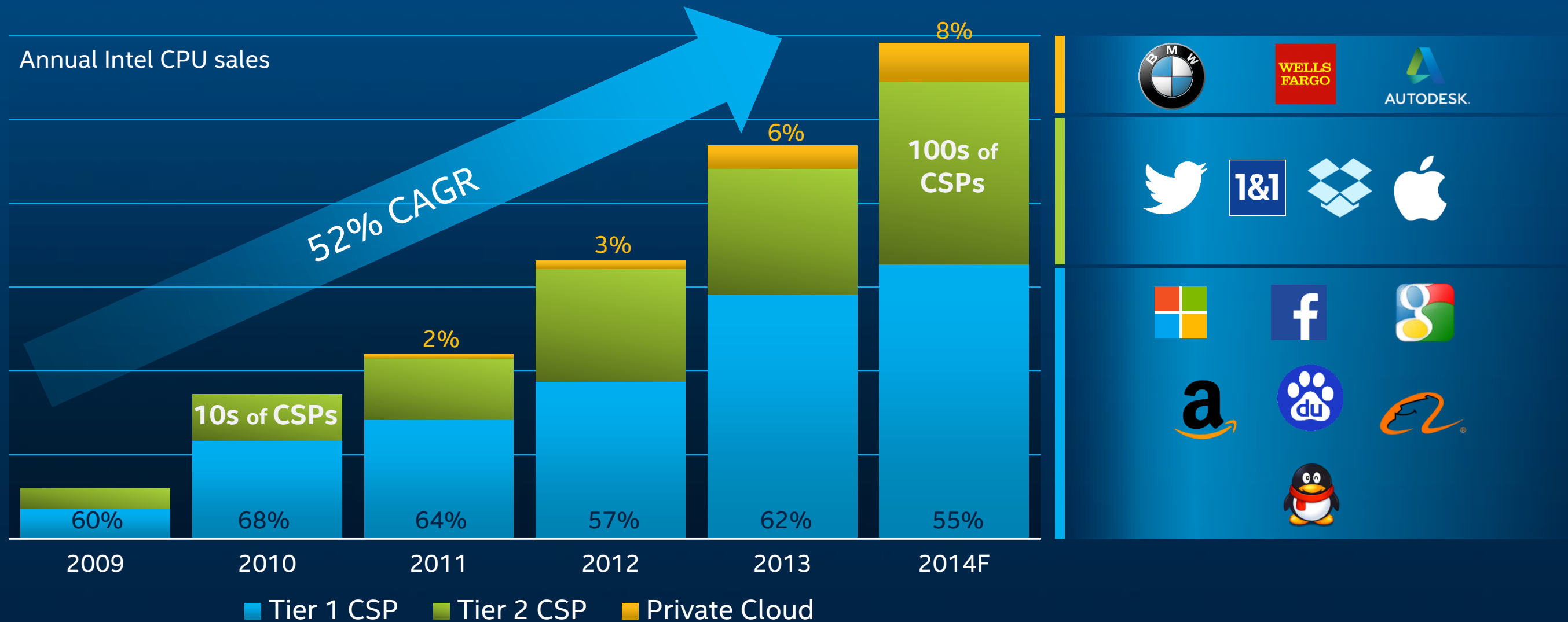
Cloud

1. Self-service
2. Automation
3. Multi-tenant
4. Measured services

■ = Resource Utilization

# Cloud Computing Growth

Connected Devices + Apps + New Services + New Service Providers





# Public Cloud SPs: Exposing Intel Value

## IBM Soft Layer

Security

Overview Security Software Firewalls SSL Certificates Compliance Intel® TXT [CHAT NOW](#)

### Intel® Trusted Execution Technology

**Making cloud safer, one Trusted Computing Pool at a time.**

Add Intel® Trusted Execution Technology (Intel® TXT) to enhance your security portfolio. SoftLayer is the first cloud company to offer the solution as an additional method to secure your infrastructure.

As the cloud industry evolves, so does the volume, complexity, and sophistication of attacks on IT infrastructure. Intel TXT provides hardware-assisted security technologies to build a secure foundation.

**Trusted Server**  
Your hardware and pre-launch software have been vetted and are in a known good state.

**Easy to Order**  
Select Intel TXT on the order form and your server is deployed in a Trusted Computing Pool.

**Stay Online**  
Protect your environment against attacks that could potentially lead to downtime.

## AWS EC2



**45** Cloud Service Providers  
branding Intel Inside cloud services

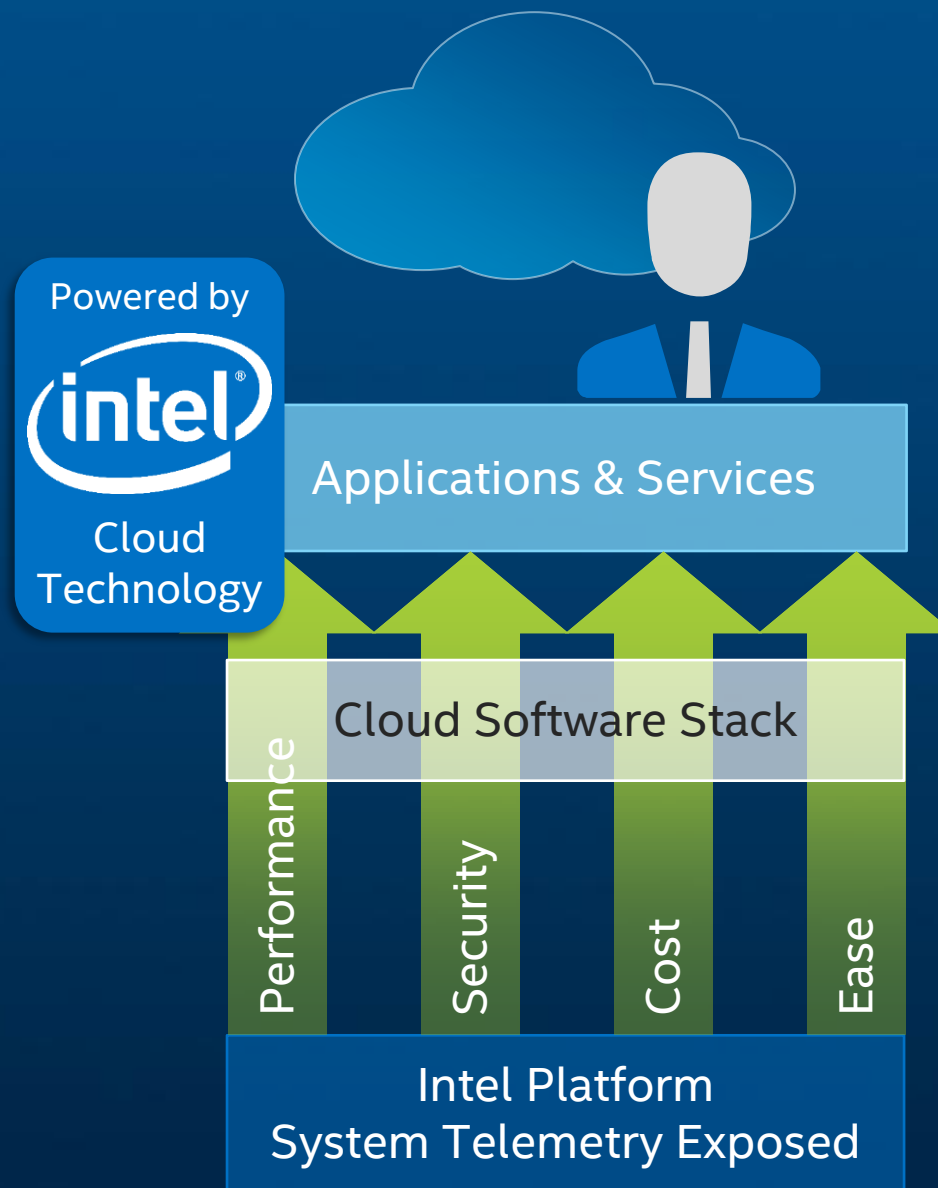
## Instance Types Matrix

Instance Type	vCPU	Memory (GiB)	Storage (GB)	Networking Performance	Physical Processor	Clock Speed (GHz)	Intel® AES-NI	Intel® AVX†	Intel® Turbo	EBS OPT	Enhanced Networking
t2.micro	1	1	EBS Only	Low to Moderate	Intel Xeon family	2.5	Yes	Yes	Yes	-	-

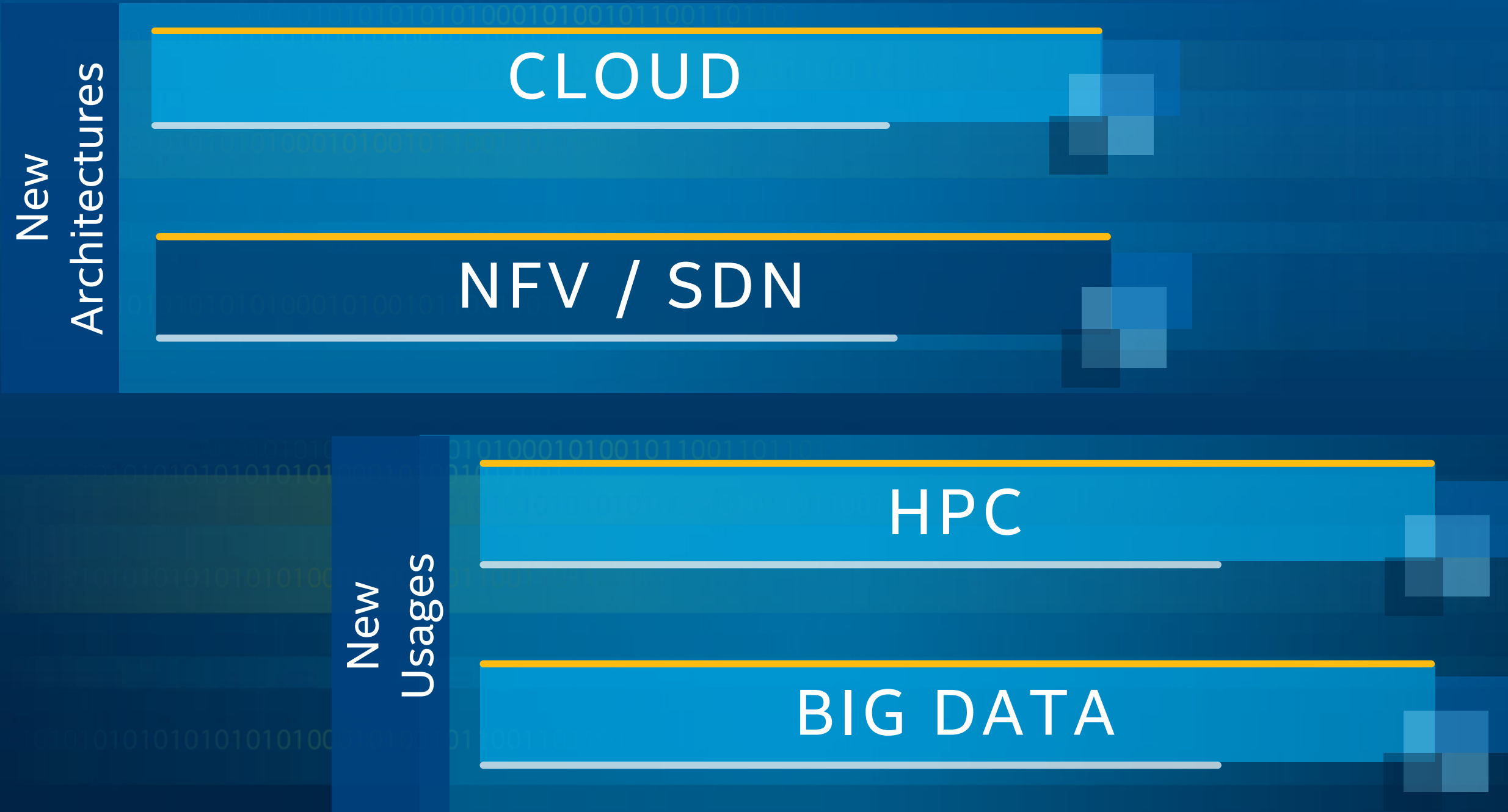
**69%**

'09-'14  
Revenue  
CAGR

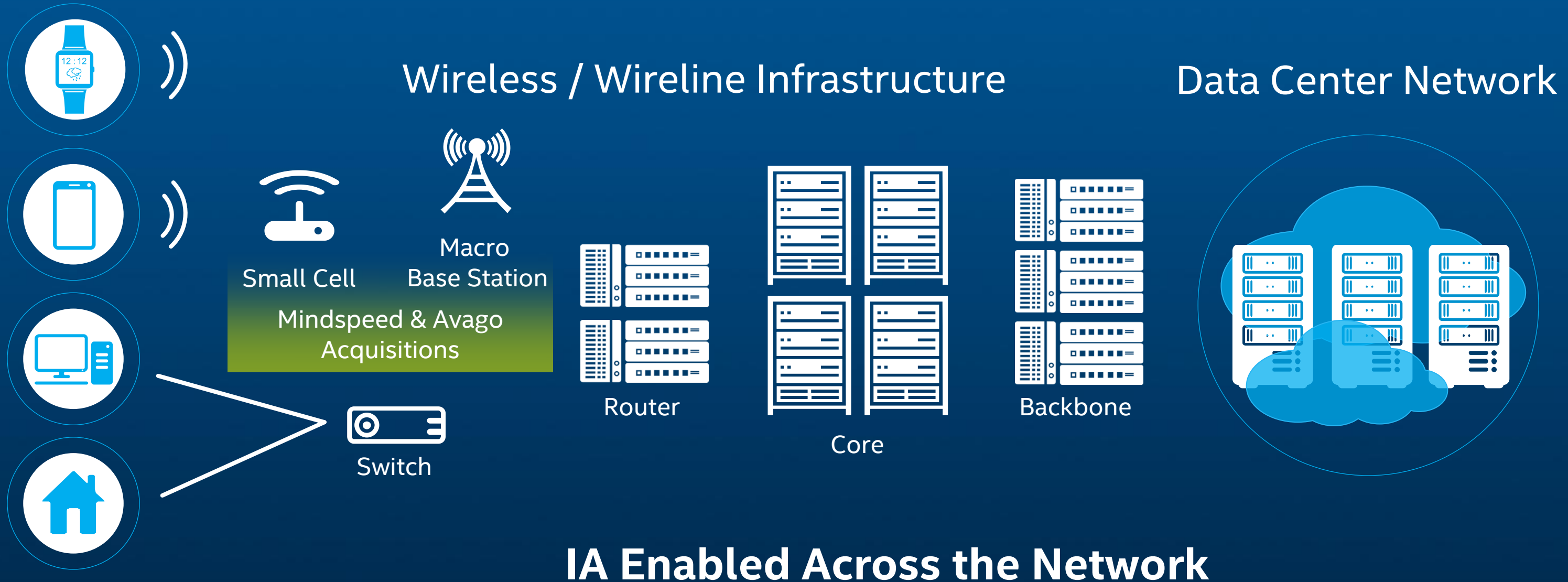
10%  
increase in  
MSS to  
**94%**  
'09-'14



# Four Growth Drivers



# Network Infrastructure



STEP 1: Consolidate workloads on Intel Architecture

STEP 2: Virtualize & automate the network (NFV / SDN)

# NFV / SDN Growth

Accelerated network transformation

2011

NFV Research Results



2012

9 Use Case Definitions



2013

Proof-of-Concepts



2014

Pilots + 1st Commercial Deployments



**Alcatel-Lucent brings IP routing to cloud with most complete portfolio of virtualized IP Edge router functions**

“...demonstrating 320G half duplex, or **greater than 2x better than competitor offers**, for a virtualized Provider Edge routing application in a single x86 server. “

- November 12, 2013





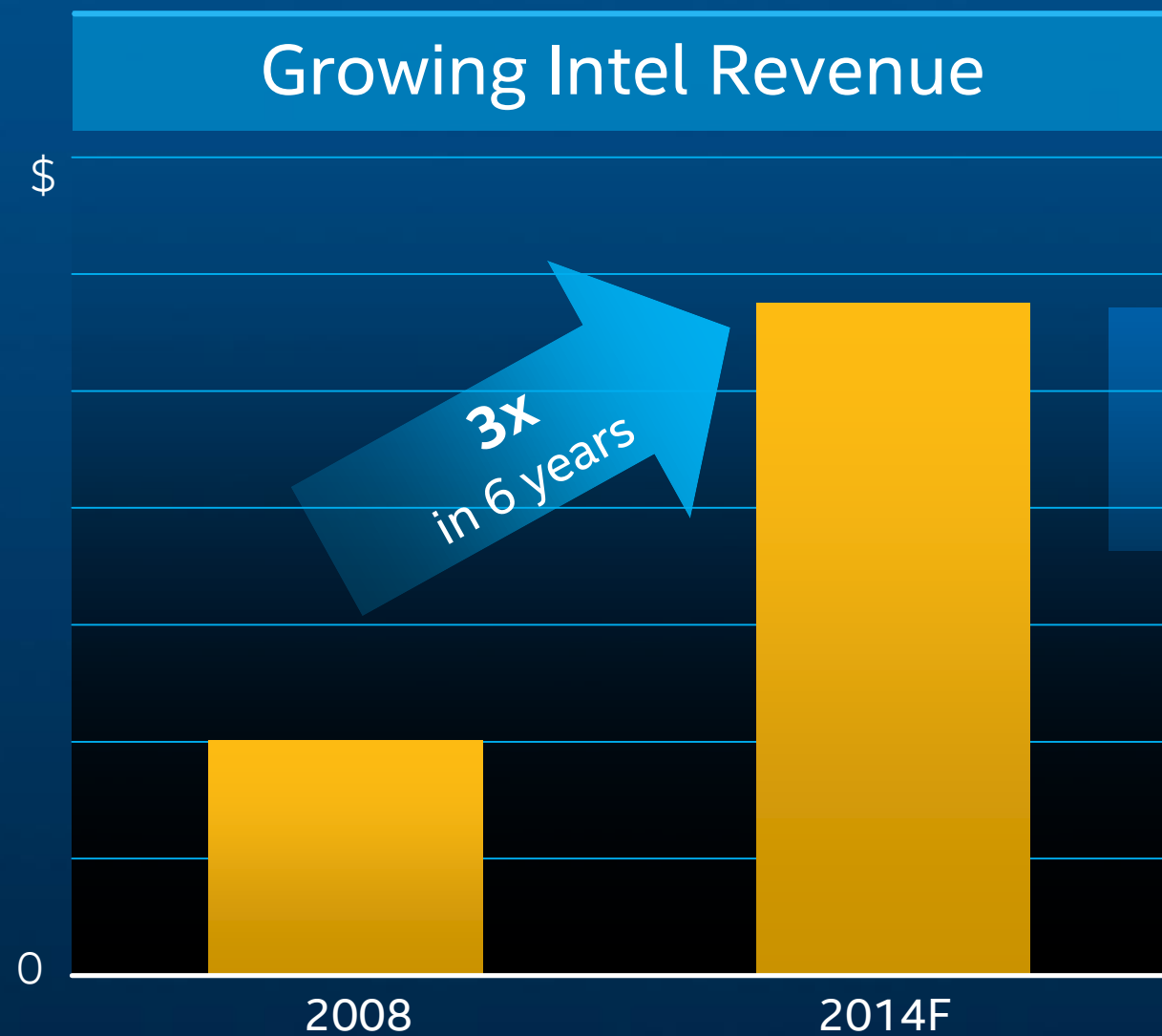
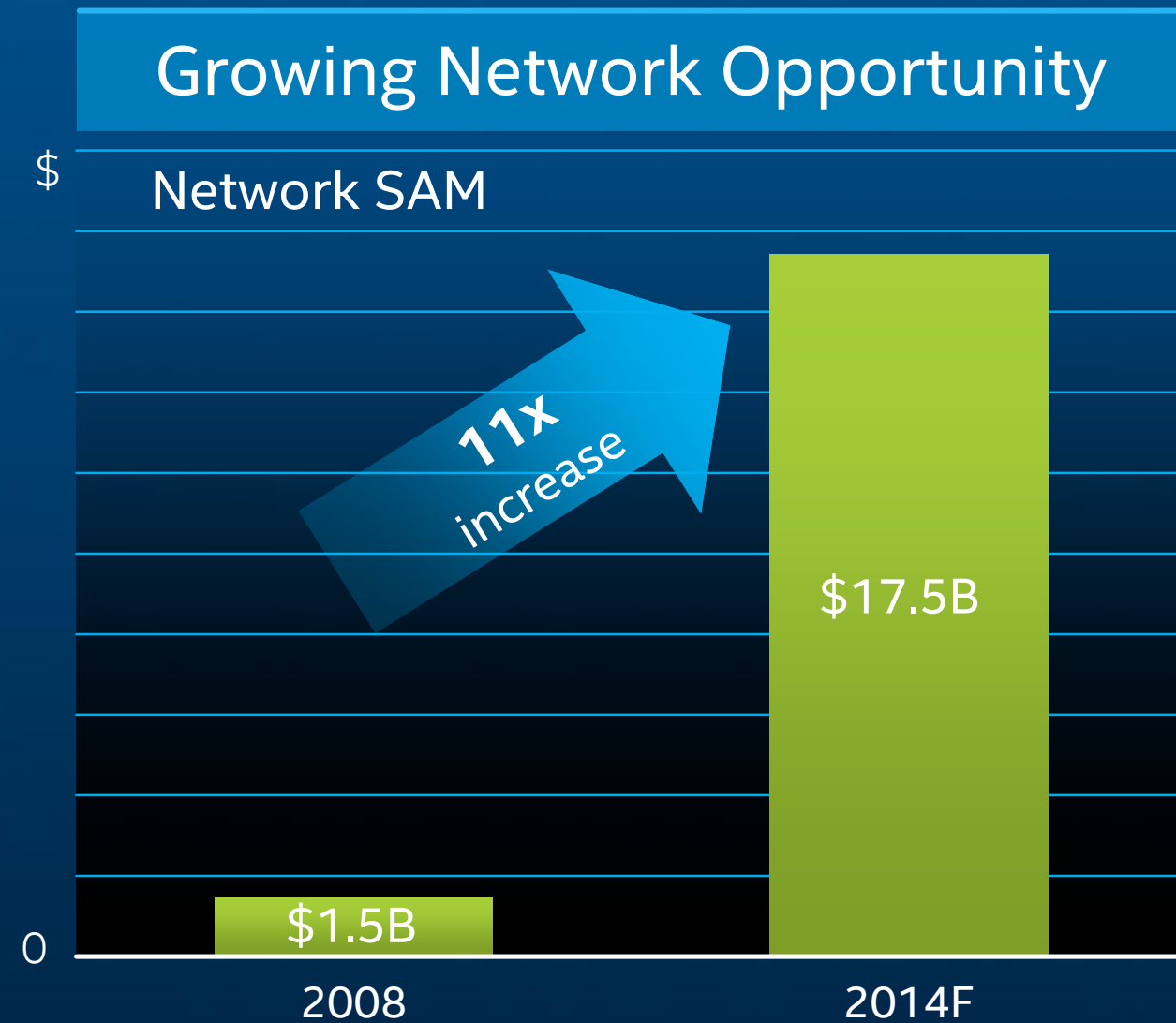
at&t

*Telefónica*

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# Maximizing Intel Opportunity & Return



**2014**  
7.5% MSS  
↑ 2.5pts YoY

**2014**  
First \$1B+ Year

# NFV / SDN Ecosystem Growth

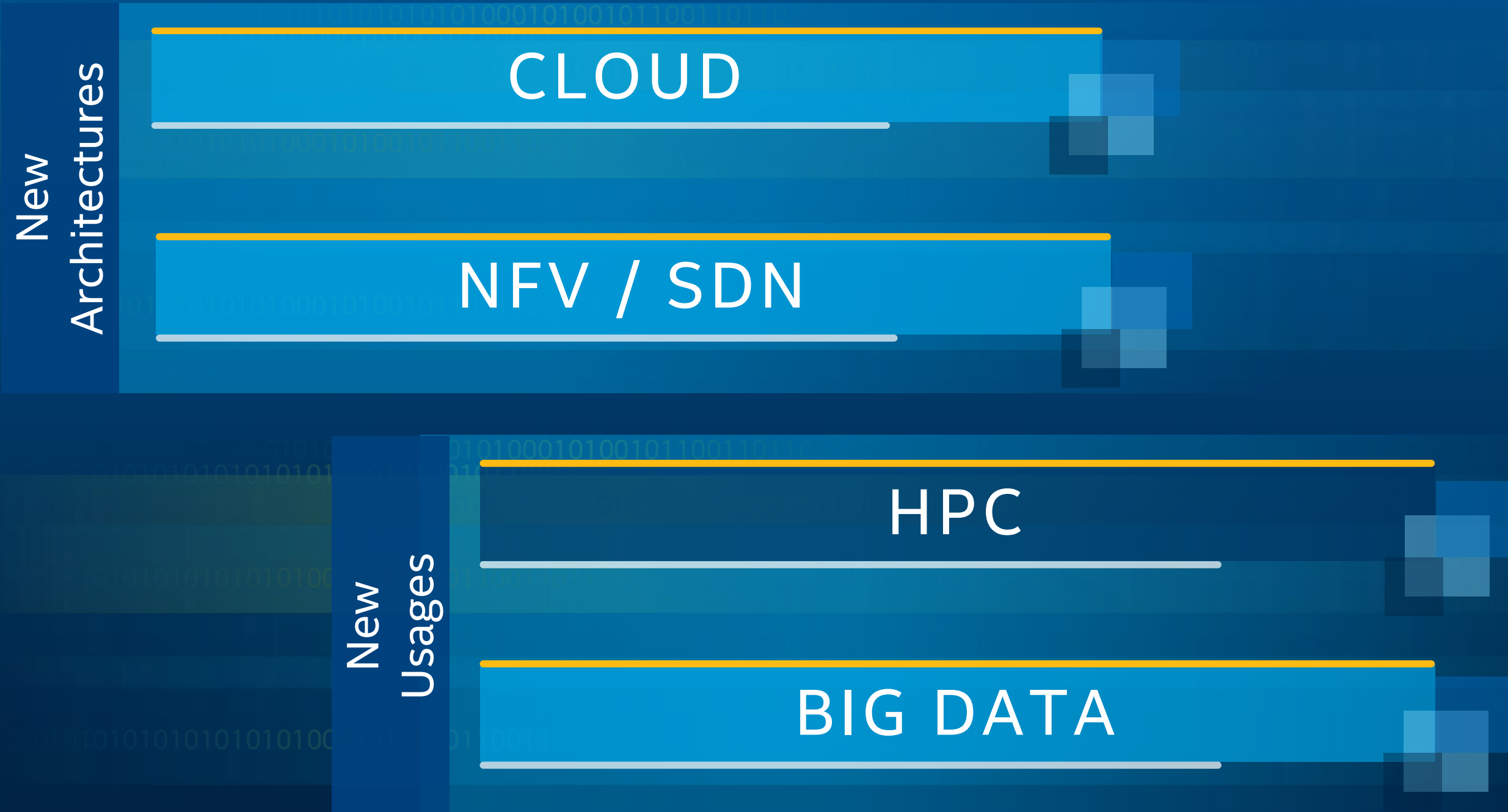
## Intel® Network Builders Program Growing the ecosystem to accelerate NFV and SDN solutions



>100 members enabling IA-based open standards solutions for Networking



# Four Growth Drivers





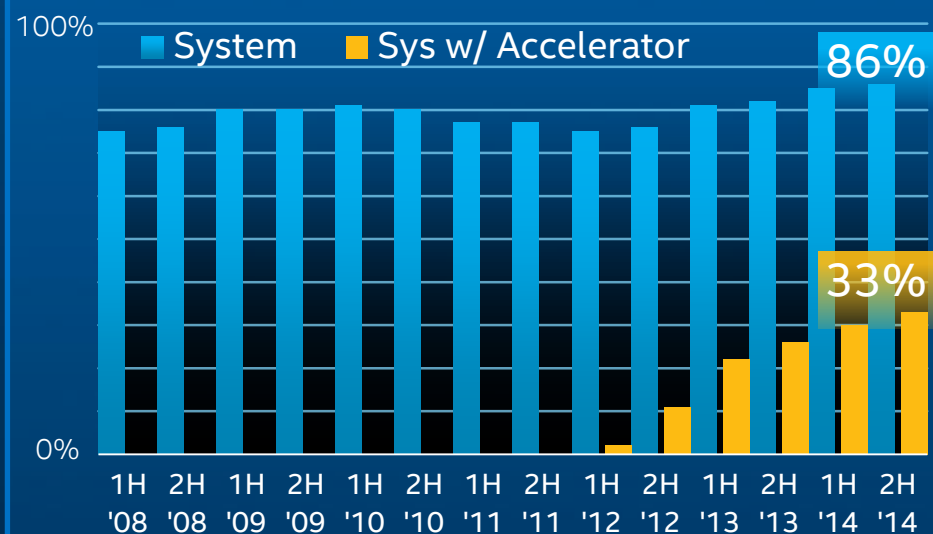
# High Performance Computing Growth

## Government & Research

\$174M  
"Trinity"



### Top 500 MSS

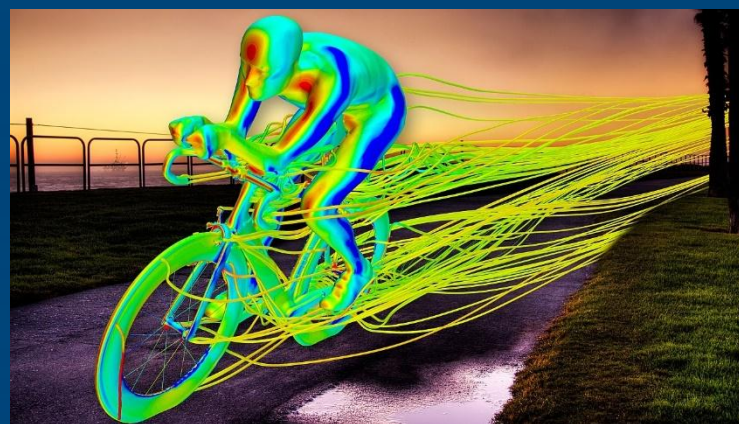


**62%**  
Top 500  
FLOP CAGR

**71%**  
Intel Top 500  
FLOP CAGR

## Commercial

Move from Physical to Digital



**2003-2013**

**70% to 92%**  
Xeon  
MSS

**11%**  
Xeon  
Unit CAGR

## New Usages

### Big Data

**PayPal**

Real-time  
analytics

**Children's Mercy**  
KANSAS CITY

Genomic  
sequencing

### Cloud

% of HPC spend in Public Cloud

**TODAY**

**~10%**

**BY 2017**

**~20%**

# HPC: Maximizing Intel Value

## Maximize Si Opportunity



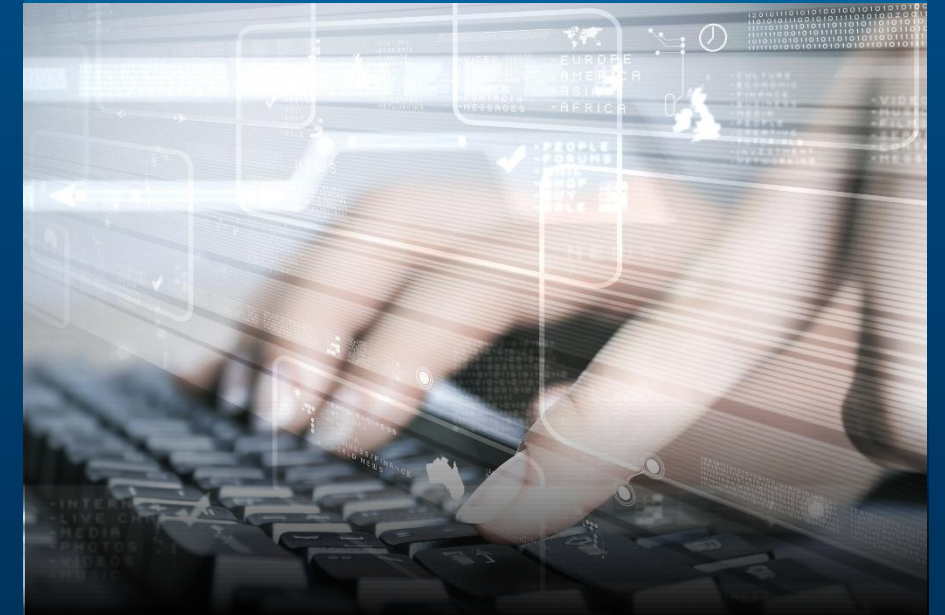
- #1 supercomputer runs on Xeon Phi
- 2<sup>nd</sup> gen design wins > 1<sup>st</sup> gen sales to date
- >50 system providers committed

## Expand System Capability



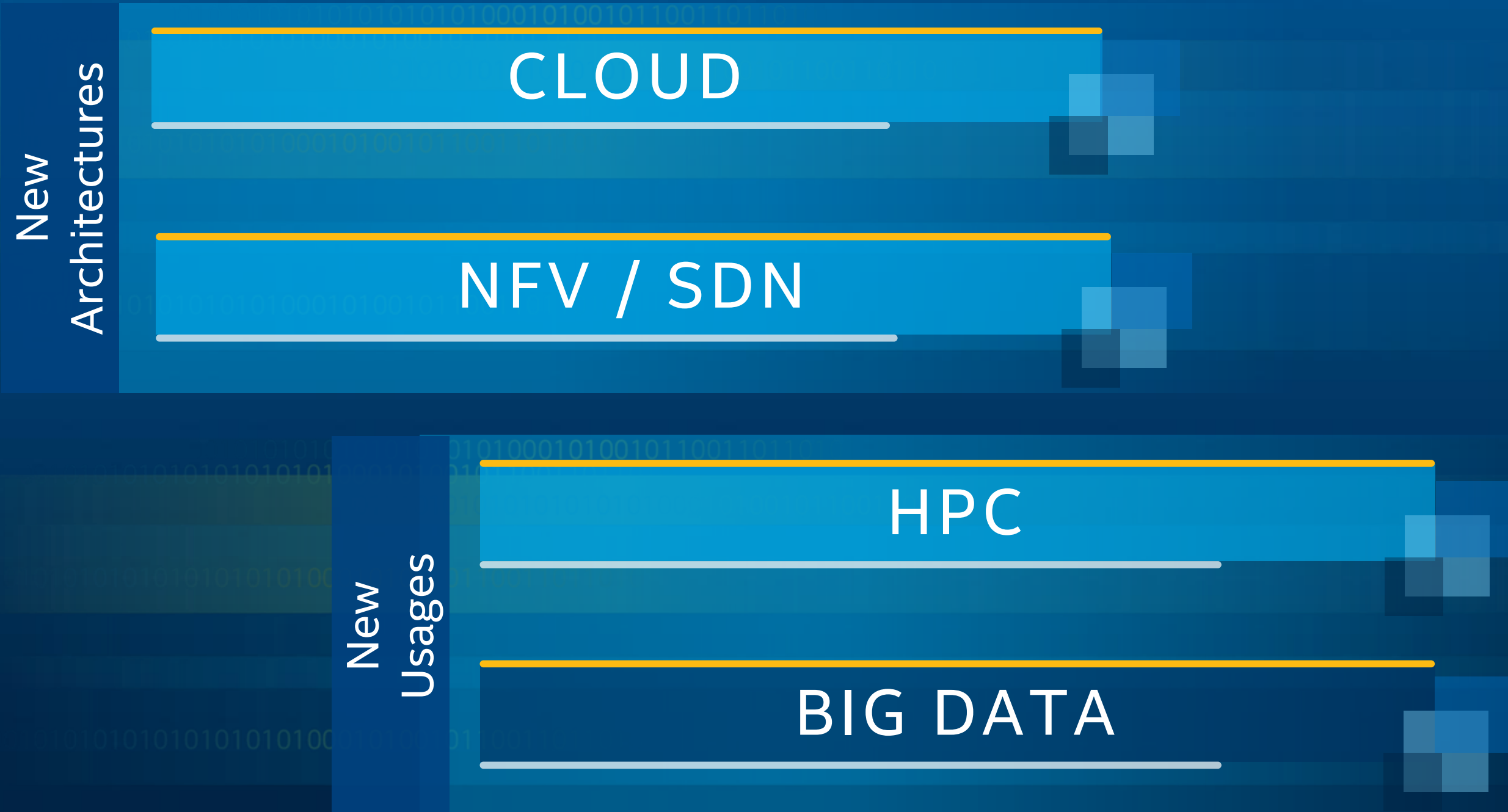
- TrueScale Infiniband growth 50% YoY
- Design wins for Omni Path integrated fabric
- HPC software stack investment

## Advance the Parallel Ecosystem



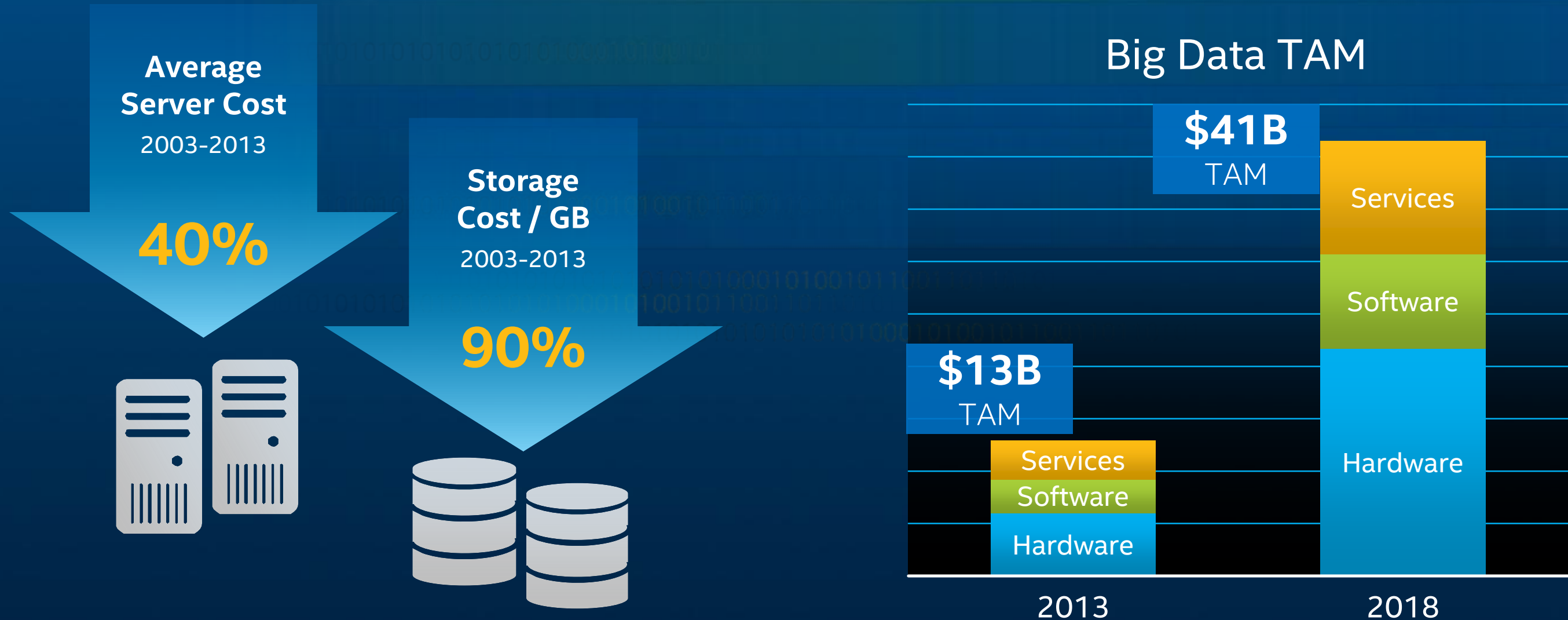
- 41 Intel Parallel Computing Centers
- 14 countries
- 70+ apps

# Four Growth Drivers



# Jevons Paradox: Big Data Growth

New discoveries drive massive amounts of compute & storage





# Big Data: Maximizing Intel Value

Accelerate implementation of Big Data solutions  
through optimized platform & tangible proof points

**cloudera**®



Hadoop  
Distribution



THE MICHAEL J. FOX FOUNDATION  
FOR PARKINSON'S RESEARCH



KNIGHT  
CANCER INSTITUTE  
Oregon Health & Science University

**A-wear**

Wearables-to-Analytics  
Developer Platform

- Addressing a \$41B TAM by 2018
- Dramatic server growth YoY
- Hadoop optimized for IA
- Industry enabling with PaaS
- Builds upon full Intel portfolio:  
Xeon, Xeon Phi, fabrics, flash, FPGA



# BIG DATA analytics

 **BASIS**  
An Intel Company

# Products and Technologies

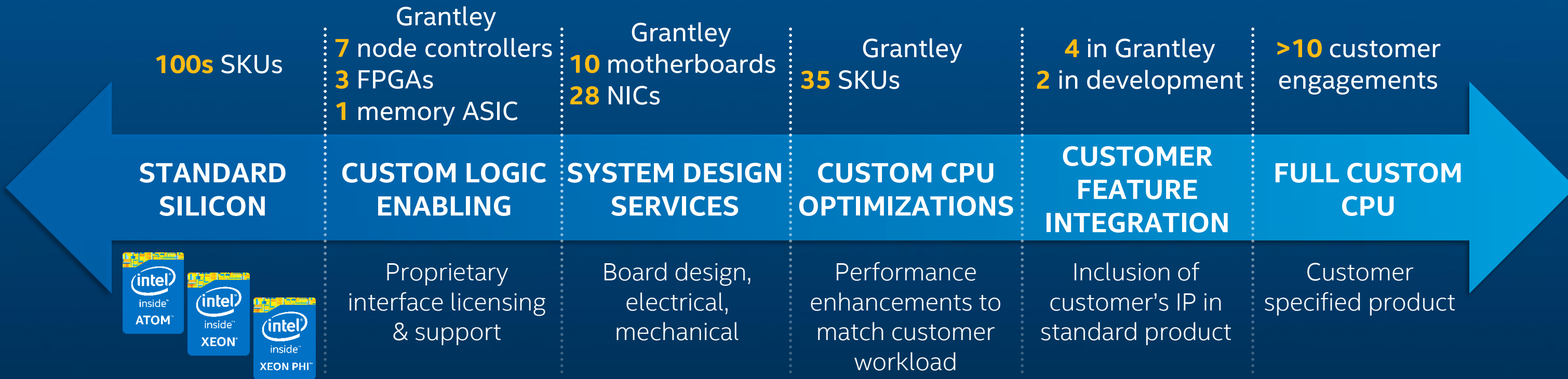
Processors: Standard to Custom

Silicon Photonics

Rack Scale Architecture



# Standard to Custom Roadmap



In the past 4 months, custom CPUs launched



# Silicon Photonics

Shipping Now



Data Centers

Fiber Optic Replacement

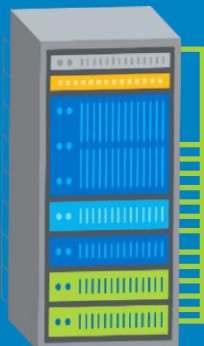
2015



HPC

Copper Replacement

2015



Rack Scale Architecture

Copper Replacement

## Disruptive Cost Structure

Cost / Bandwidth Density	100G	400G	1TB
Intel Silicon Photonics	x	y	z
Other Silicon Photonics	~2x	~3y	~4z
Discrete Fiber	~3x	~6y	~10z

I/O = 30% of System Cost

Remove density constraints

Serviceability & reliability

Lower power

100Gb/s in Rack

Copper 100Gb/s limited to 3m

Silicon Photonics 100 Gb/s reach of up to 2km

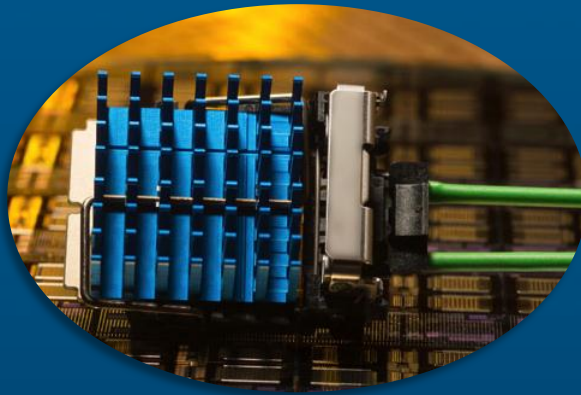
Only fully integrated silicon solution; benefitting from Moore's Law



# Silicon Photonics: Moving Data with Lasers

## Industry Standard Cabling & Connectors

Intel Silicon Photonics module

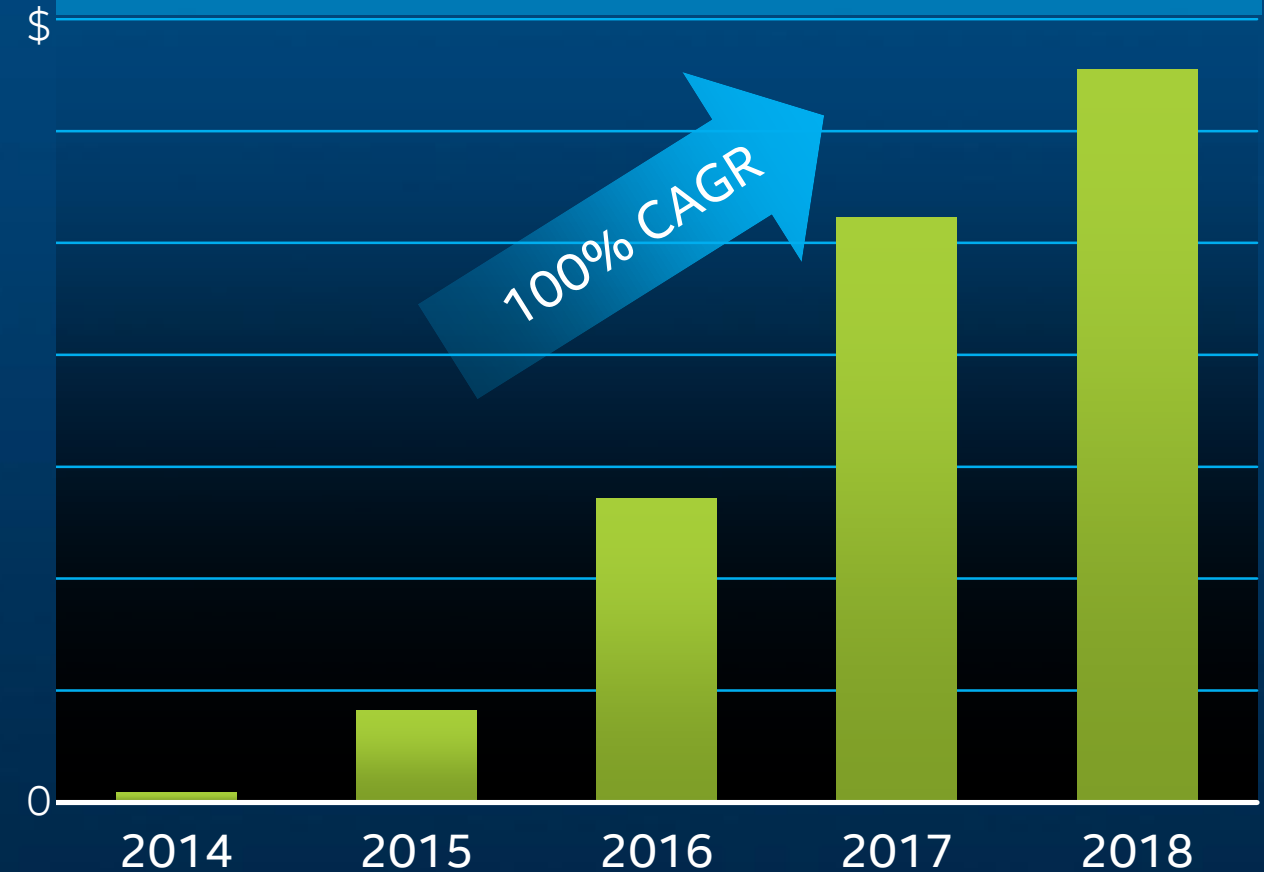


Multiple suppliers commercializing MXC standard

## Design Wins



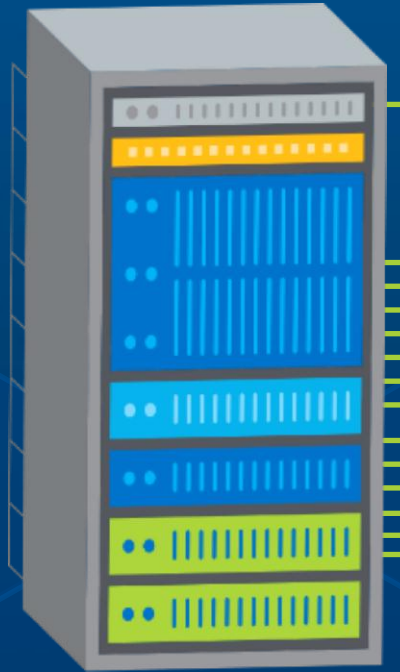
## Silicon Photonics Revenue Forecast



# Rack Scale Architecture

2015

- With Cloud the rack becomes the unit of compute
- Compose & decompose resources dynamically based on application need



Intel Ethernet controller & switch



Intel Silicon Photonics



Intel SSD

Up to 1.5X servers per rack

Up to 5X reduction in provisioned power

Up to 3X fewer cables

Customers & Partners

# Competition

High interest in data center business



## Why Intel

- Leadership roadmap across Server, Storage & Network
- Customization for targeted workloads
- ~\$2B annual R&D investment
- Broadest ecosystem & compatibility
- Best perf / TCO

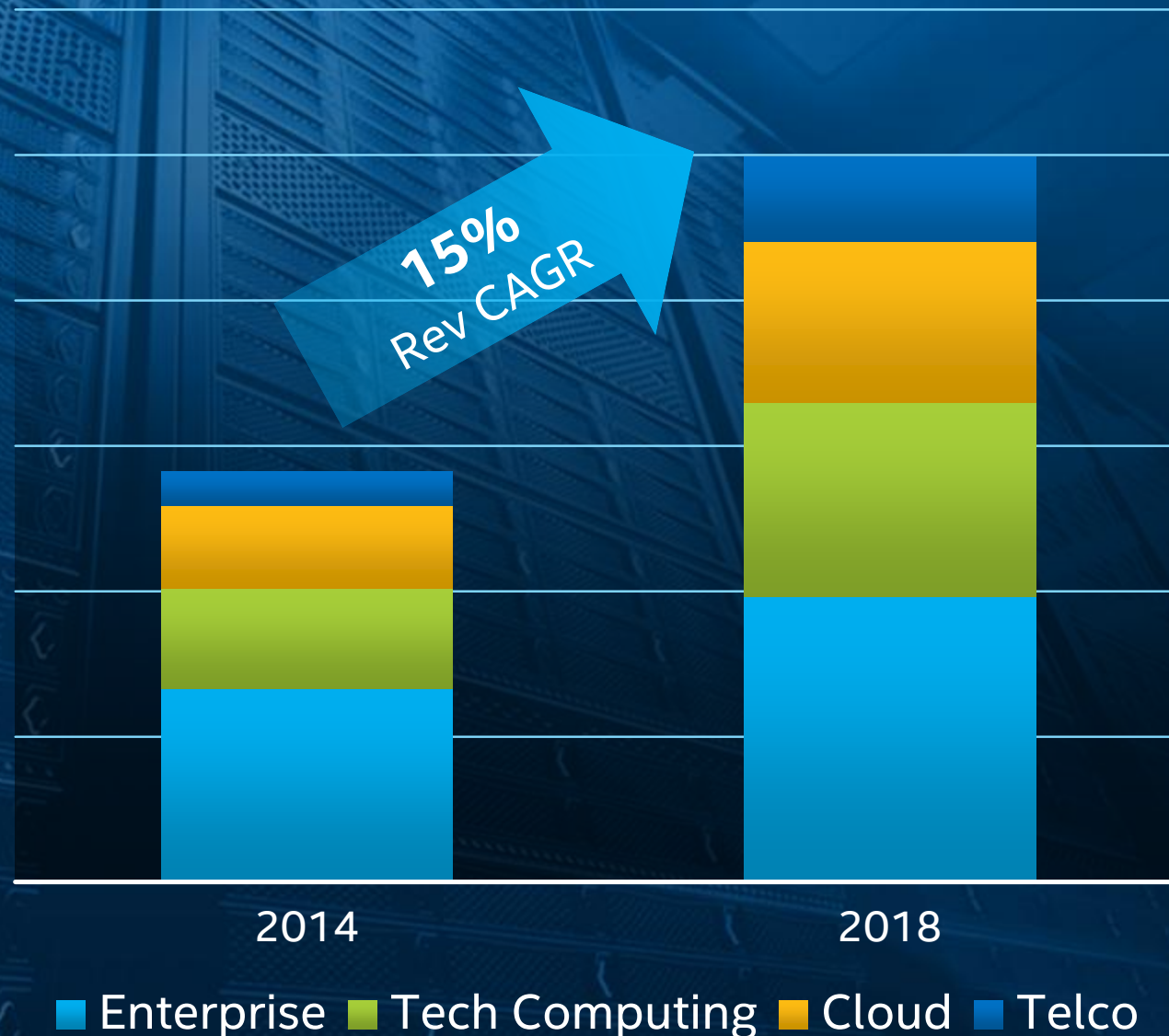
Any time I work out the cost models, it's not quite there. Intel is also easier to work with on some of the custom work that Amazon requires.

- James Hamilton, vice president  
for Amazon Web Services



# Data Center Summary

## Data Center Revenue Forecast



- Industry trends create continued revenue growth opportunities

Cloud	NFV / SDN	HPC	Big Data
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- Investing to win across Server, Storage, network
  - Performance and TCO leadership
  - Expanding technology portfolio – fabrics, silicon photonics, customization driving revenue growth
- Revenue CAGR of ~15% through 2018





# For More Information

## Demos

NFV Service Chaining

Big Data Analytics in Retail

Rack Scale Architecture

Silicon Photonics in HPC

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- Intel's results could be affected by the timing of closing of acquisitions, divestitures and other significant transactions.
- Intel's results could be affected by adverse effects associated with product defects and errata (deviations from published specifications), and by litigation or regulatory matters involving intellectual property, stockholder, consumer, antitrust, disclosure and other issues. An unfavorable ruling could include monetary damages or an injunction prohibiting Intel from manufacturing or selling one or more products, precluding particular business practices, impacting Intel's ability to design its products, or requiring other remedies such as compulsory licensing of intellectual property.

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# INVESTOR MEETING 2014

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